Massachusetts Department of Environmental Protection
Source Water Assessment and Protection (SWAP) Report
for
Worthington Fire District

What is SWAP?

The Source Water Assessment Program (SWAP), established under the federal Safe Drinking Water Act, requires every state to:

? Inventory land uses within the recharge areas of all public water supply sources;

? Assess the susceptibility of drinking water sources to contamination from these land uses; and

? Publicize the results to provide support for improved protection.

SWAP and Water Quality

Susceptibility of a drinking water source does *not* imply poor water quality. Actual water quality is best reflected by the results of regular water tests.

Water suppliers protect drinking water by monitoring for more than 100 chemicals, treating water supplies, and using source protection measures to ensure that safe water is delivered to the tap.

Prepared by the Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Drinking Water Program

Date Prepared:
October 9, 2003

Table 1: Public Water System (PWS) Information

PWS Name	**Worthington Fire District**
PWS Address	**P.O. Box 1000, Division Street**
City/Town	**Worthington, Massachusetts**
PWS ID Number	**1349000**
Local Contact	**Mr. John Sullivan**
Phone Number	**413-238-5344**

Well Name	***Source ID#***	***Zone I (in feet)***	***IWPA***	***Source Susceptibility***
Well #1	1349000-01G	217	533	Moderate
Well #2	1349000-02G	217	533	Moderate
Well #3	1349000-03G	301	889	Moderate
Well #4	1349000-04G	217	533	Moderate
Well #5	1349000-09G	165	460	Moderate
Well #6	1349000-10G	232	568	Moderate
Well #7	1349000-11G	255	640	Moderate
Spring Name			*Zone II GIS ID #*	
Spring #1	1349000-05G	291	604	Moderate
Spring #2	1349000-06G	291	605	Moderate
Spring #3	1349000-07G	291	605	Moderate
Spring #4	1349000-08G	291	606	Moderate

Introduction

We are all concerned about the quality of the water we drink. Groundwater sources may be threatened by many potential contaminant sources, including septic systems, road salting, and improper disposal of hazardous materials. Citizens and local officials can work together to better protect these drinking water sources.

Purpose of this report:
This report is a planning tool to support local and state efforts to improve water supply protection. By identifying land uses within water supply protection areas that may be potential contaminant sources, the assessment helps focus protection efforts on appropriate best management practices (BMPs) and drinking water source protection measures. Department of Environmental Protection (DEP) staff are available to provide

What is a Protection Area?

A well's water supply protection area is the land around the well where protection activities should be focused. Each well has a Zone I protective radius and an Interim Wellhead Protection Area (IWPA).

- **The Zone I** is the area that should be owned or controlled by the water supplier and limited to water supply activities.
- **The IWPA** is the larger area that is likely to contribute water to the well.

In many instances the IWPA does not include the entire land area that could contribute water to the well. Therefore, the well may be susceptible to contamination from activities outside of the IWPA that are not identified in this report.

What is Susceptibility?

Susceptibility is a measure of a well's potential to become contaminated due to land uses and activities within the Zone I and Interim Wellhead Protection Area (IWPA).

information about funding and other resources that may be available to your community.

This report includes:

1. Description of the Water System
2. Discussion of Land Uses within Protection Areas
3. Recommendations for Protection
4. Attachments, including a Map of the Protection Areas

1. Description of the Water System

Worthington is a small rural "hilltown" community, east of the Berkshire Hills of western Massachusetts. Worthington is primarily a residential and agricultural community that is a natural tourist attraction. The Worthington Fire District provides water for a small section of town, primarily the town center. The District maintains and operates eleven (11) sources of water. The sources are seven bedrock wells (01G-04G and 09G-11G) and four-spring sources (05G-08G); all are located in relatively close proximity to each other in the north central section of town.

During the mid-1990s, the area experienced a dry summer and the District's sources where inadequate to meet demand. Some of the existing wells were deepened and additional wells drilled to meet the system needs. Wells range in depth from 280 to 550 feet and the springs are bedrock fed springs with collection boxes that have been reconstructed and/or otherwise protected from surface water influences. The bedrock in the area is mapped as the lower Goshen Formation, a carbonaceous schist and phyllite. There is significant bedrock exposure with some area of thin to moderate depth of till overlying bedrock. Although some of the wells are flowing artesian wells, there is no evidence of a significant and continuous protective, confining unit throughout the protection areas. Sources located in aquifers such as this are considered highly vulnerable to contamination from activities conducted on the land surface. Recent experience has shown that activities that cause significant disturbance to the land surface such as logging, on areas within the Zone I and Zone II of spring sources with thin overburden or exposed bedrock, can be negatively impacted by increased turbidity in the water.

The Zone I is the most protected area around a groundwater source. The Interim Wellhead Protection Area (IWPA) is an area that is assumed to contribute recharge to the source until a scientifically determine Zone II, contribution area for a groundwater source. The radii of the Zone I and Interim Protection Area (IWPA) for the wells are based on estimated yields of the wells as determined from pumping tests conducted on each well. The estimated yield of the wells ranges from approximately 2 to 15.5 gallons per minute.

Table 2: Table of Activities within the Water Supply Protection Areas

Potential Contaminant Sources	Zone I	IWPA/ Zone II	Threat	Comments
Transportation Corridor	01G, 02G, 04G, 05G	All except 06G/07G	Moderate	Limit road deicing materials; monitor and control drainage
Residential	-	All except 05G, 06G, 07G, 08G	Moderate	Provide BMPs to residents
Septic System	-	All except 05G, 6G, 07G, 08G	Moderate	See septic systems brochure in the appendix, relocate septic systems outside of Zone I
Lawn Care/Gardening	-	All except 05G, 06G, 07G, 08G	Moderate	Provide BMPs to residents

-For more information on Contaminants of Concern associated with individual facility types and land uses please see the SWAP Draft Land Use / Associated Contaminants Matrix on DEP's website - www.state.ma.us/dep/brp/dws/.

Glossary

Zone I: The area closest to a well; a 100 to 400 foot radius proportional to the well's pumping rate. To determine your Zone I radius, refer to the attached map.

IWPA: A 400-foot to ½ mile radius around a public water supply well proportional to its pumping rate; the area DEP recommends for protection in the absence of a defined Zone II. To determine IWPA radius, refer to the attached map.

Zone II: The primary recharge area defined by a hydrogeologic study.

Aquifer: An underground water-bearing layer of permeable material that will yield water in a usable quantity to a well.

Hydrogeologic Barrier: An underground layer of impermeable material that resists penetration by water.

Recharge Area: The surface area that contributes water to a well.

The Zone I for a spring is a square area centered on the source in the direction of flow with the source 50 feet from the downgradient edge of the Zone I. The lengths of the sides of the square are based on the estimated flow from the spring or estimated volume of water used from the source. The USGS was contracted by the DEP to determine the contribution areas (Zone II) to spring sources as part of the SWAP program. Please refer to the enclosed map for the outline of the protection areas for the District's sources. The Zone I, IWPA and Zone II areas are primarily forest with a single dirt road and several residences. Chlorine is added to the water for disinfection prior to distribution. You may request additional, current information regarding the quality of the water, from the local contact listed in Table 1. Please refer to the attached maps of the Zone I, IWPA and Zone II protection areas and Table 2 for additional assessment information.

2. Discussion of Land Uses in the Protection Areas

There are few land uses and activities within the drinking water supply protection areas that are potential sources of contamination.

Key issues include:

1. **Non-conforming Zone I,**
2. **Residential uses, and**
3. **Transportation corridor.**

The sources are located in an aquifer with a high vulnerability to contamination due to the absence of a significant hydrogeologic barrier to prevent contaminant migration. However, the overall ranking of susceptibility to contamination for the system is moderate, based on the presence of at least one moderately ranked land use or activity in the protection areas, as seen in Table 2.

1. Non-conforming Zone I – The District does not own or control the entire Zone I for all of its sources. Although the District owns much of the Zone I areas, the district does not own the entire Zone I for sources 01G, 02G, 04G and 05G. The Zone I area for these sources contains a road. DEP's land control restrictions for Zone I only allow water supply related activities in Zone I or activities that do not pose a potential threat.

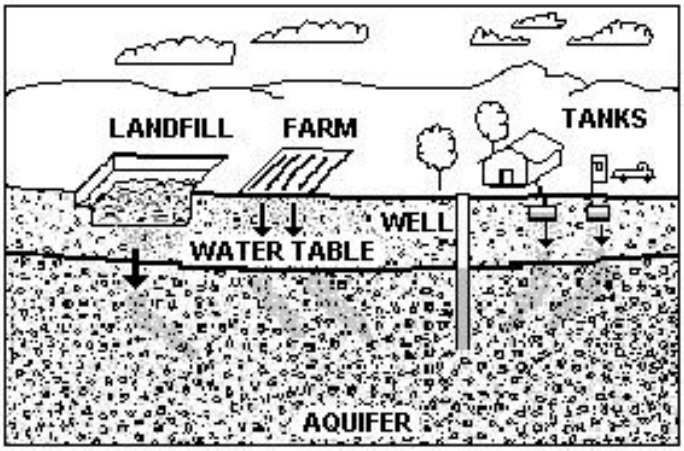

Figure 1: Example of how a well could become contaminated by different land uses and activities.

Systems not meeting DEP Zone I requirements must get DEP approval and address Zone I issues prior to increasing water use or modifying systems.

Recommendations:

- ✓ Do not use or store pesticides, fertilizers or road deicing materials, as is feasible, within the Zone I.
- ✓ Monitor road runoff to ensure that it does not flow toward the well and springs in the Zone I. Continue current efforts in upgrading and maintaining protection of the well and spring heads.
- ✓ Within the long term planning for the system, consider relocating sources adjacent to the road if activities cannot be controlled or water quality is impacted.

2. Residential Land Uses – The residences have on-site septic systems. If managed improperly, activities associated with residential areas can contribute to drinking water contamination. Common potential sources of contamination include:

- ➢ **Septic Systems** – Improper disposal of household hazardous chemicals to septic systems is a potential

Additional Documents:

To help with source protection efforts, more information is available by request or online at www.state.ma.us/dep/brp/dws, including:

1. Water Supply Protection Guidance Materials such as model regulations, Best Management Practice information, and general water supply protection information.
2. MA DEP SWAP Strategy
3. Land Use Pollution Potential Matrix
4. Draft Land/Associated Contaminants Matrix

For More Information:

Contact Catherine Skiba in DEP's Springfield Office at (413) 755-2119 for more information and for assistance in improving current protection measures.

More information relating to drinking water and source protection is available on the Drinking Water Program web site at: www.state.ma.us/dep/brp/dws/

source of contamination to the groundwater because septic systems lead to the ground. If septic systems fail or are not properly maintained, they could be a potential source of microbial contamination.

- **Household Hazardous Materials** - Hazardous materials may include automotive wastes, paints, solvents, pesticides, fertilizers, and other substances. Improper use, storage, and disposal of chemical products used in homes are potential sources of contamination.
- **Heating Oil/Kerosene Storage** - Private residences within the IWPA may heat with fuel oil or diesel fuel. If managed improperly, Underground and Aboveground Storage Tanks (USTs and ASTs) can be potential sources of contamination due to leaks or spills of the fuel oil/kerosene they store.
- **Stormwater** – Catch basins transport stormwater from roadways and adjacent properties to the ground. As flowing stormwater travels, it picks up debris and contaminants from streets and lawns. Common potential contaminants include lawn chemicals, pet waste, and contaminants from automotive leaks, maintenance, washing, or accidents.

Residential Land Use Recommendations:

- ✓ Educate residents on best management practices (BMPs) for protecting water supplies. Distribute the fact sheet "Residents Protect Drinking Water" available in Appendix A and on www.mass.gov/dep/brp/dws/protect.htm, which provides BMPs for common residential issues.
- ✓ Promote BMPs for stormwater management and pollution controls.

3. **Transportation corridors –** Even low use, rural residential roads can be potential sources of contamination due to use of deicing materials, leaks or spills of fuels and other hazardous materials during accidents and erosion.

Recommendation:

- ✓ Continue current contacts with local highway department and local emergency responders department to ensure that the protection areas are included in Emergency Response Planning.

3. Protection Recommendations

Implementing protection measures and best management practices (BMPs) will reduce the well's susceptibility to contamination. The Worthington Fire District is commended for current and past protection measures including the development of a protection plan, upgrade of the infrastructure and purchase of land around the sources. With the delineation of the Zone II contribution areas for the springs, the district should review the existing protection plan, update information as appropriate and work with the community in development of additional protection strategies as appropriate.
Please review and adopt the key recommendations listed above and as is feasible.

Zone I:

- ✓ Prohibit any new non-water supply activities from the Zone I.
- ✓ Continue regular inspections of the Zone I. Monitor for evidence of unauthorized access.
- ✓ Monitor activities and if there is evidence of increased activity or access, consider fencing and gating the immediate area around the springs/well

Facilities Management:

- ✓ Control surface runoff around the springs and wells' casings to prevent infiltration. Earthen or concrete berms or collars should slope away from the source and well casings should extend above ground.
- ✓ Monitor deliveries of chemicals to the facility

Planning:

- ✓ Have a plan to address short-term water shortages and long-term water demands. Keep the phone number of a bottled water company readily available and continue assessment of future needs of the system.

Supplement the SWAP assessment with additional local information and incorporate it into water supply educational efforts. Use a potential contaminant threat inventory to assist in setting priorities, focusing inspections, and creating educational activities.

These recommendations are only part of your ongoing local drinking water source protection. Citizens and community officials should use this SWAP report to encourage discussion of local drinking water protection measures.

Attachments

- Map of the Public Water Supply (PWS) Protection Area
- Recommended Source Protection Measures Fact Sheet